Effects of innovation on exports in Spanish cooperatives

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Abstract
This paper analyses the relationship between innovation and export status of Spanish manufacturing work cooperatives. Our working hypothesis is that innovation has a positive and significant impact on the cooperatives' exporting status. To carry out the empirical study we work with a well-known and widely used Spanish statistical source of the manufacturing sector. Our findings indicate that innovation is positively and significantly related to the cooperatives' export status. Other variables such as size, age and wages also exert an influence on exporting decisions.

Key words: Cooperatives; exports; innovation

JEL classification: D22; F14; J54; O31

1. Introduction

There is a growing body of empirical studies that followed Bernard and Jensen (1995) pioneer analysis focusing on the relationship between firm characteristics and exporting. The common conclusions are that this relationship exists and that exporting firms exhibit better performance than non-exporting ones (Girma et al. 2004). Exporters may be better because firms become exporters, or because exporting improves performance. In

this sense, two different, though not mutually exclusive, causality explanations have arisen: self-selection and learning-by-exporting.

The self-selection mechanism implies that most productive firms self-select into foreign markets because they are in a better position to recover sunk costs associated with foreign sales (Bernard and Jensen, 1999). Under a scenario of heterogeneity in performance and a monopolistic competition framework, Melitz (2003) introduces a model where firms will only export if they find it profitable. The relationship between profitability and productivity implies that there is a "productivity threshold" below which firms cannot generate a sufficient profit to participate in export market. Thus, the most productive firms self-select into exporting activities because they are able to recover sunk costs linked with foreign market (Andersson et al. 2008).

The second explanation that exporters may be better is related to the fact that firms become more efficient after they begin exporting. It is the so-called learning-by-exporting mechanism (Clerides et al., 1998). On the basis of this mechanism lies the idea that exporting becomes a process of knowledge and learning that has a positive effect on firm performance. International market firms have to face higher competition than firms which remain in the domestic market and therefore the former need to improve faster than the latter (Haidar, 2012).

There is widespread empirical agreement that the self-selection mechanism works. Instead, the existence of the learning-by-exporting mechanism does not have so much evidence (Wagner, 2012; Ferrante and Freo, 2019; Serrano and Myro, 2019).

A related strand of research argues that firms consciously increase their productivity in order to become exporters. The ex-ante period may suppose an intermediate step related to the timing of learning. This is what is referred to as the "learning to export" or 'effect of conscious self-selection" (López, 2009; Movahedi et al., 2017; Gupta et al., 2018). The intention and willingness to export lead firms to make conscious efforts to improve their performance so that their productivity improves, in contrast to non-exporters who continue anchored in the domestic market (Alvarez and López, 2005; López, 2009; Minondo, 2011; Movahedi et al., 2017; Hahn and Choi, 2020).

There is an important number of research studies that prove a strong positive impact of innovations on exports (Caldera, 2010; Damijan et al., 2010; Monreal-Pérez et al., 2012; Becker and Egger, 2013; Freixanet and Churakova, 2018). In this sense, some scholars (see Ayllón and Radicic, 2019; Máñez-Castillejo, Rochina-Barrachina, and Sanchis-Llopis, 2009) point out that, in this relationship, it is possible to find (a) direct effects, linked to possibility of greater demand, and (b) indirect effects, linked to the role of innovation as a key factor to enhance productivity. Firms may

transform their intention to export into the capacity to export –effect of conscious self-selection– by increasing their technology or by improving the quality of their products (Alvarez and López, 2005; López, 2009; Minondo, 2011).

This paper focuses on this field of analysis. Specifically, we are interested in analysing the relationship between innovation and export status of work cooperatives, an alternative organization to the capitalism firms. The main contribution of this paper is that, to our knowledge, it offers the first analysis on this issue for a panel of Spanish manufacturing work cooperatives, (henceforth 'cooperatives').

Based on what has been said, the central hypothesis of this work is:
Innovation has a positive and significant impact on the cooperatives' exporting status.

Addressing a cooperatives study is not a simple endeavour since Spain has a long tradition with regard to cooperatives. Nowadays, they remain an important economic engine which derives not so much from their contribution to the Spanish macroeconomic data (they account for roughly 0.6% of the added value, and generate, in average, a bit more than 1% of employment) but because we are facing an organizational model that has demonstrated its capacity to survive in a capitalist environment and whose goals go further towards maximizing profits (Sala-Ríos et al., 2018).

2. Data

Throughout the analysis we use a Spanish firm-level panel dataset spanning 26 years (1991-2016). The data comes from the Encuesta sobre Estrategias Empresariales (ESEE) that is drawn up annually by the Fundación SEPI under an agreement with the current Spanish Ministry of Finance. The survey provides a representative sample of the population of Spanish manufacturing firms with ten or more employees. The survey contains, in a consistent way, time series of cooperatives. Its unbalanced nature derives from the frequency of entry and exit behaviour of firms, and from the missing observations. The activity of firms is classified into 20 different industries, according to the three-digit aggregation CNAE-09 of manufacturing industries. Our initial sample covers 101 work cooperatives of the manufacturing sector. After cleaning the data, avoiding missing information on critical variables for the analysis, our final sample is an unbalanced panel of 70 cooperatives, which provided information for at least three consecutive years over the period 1991–2016.

Table 1 provides information of the exporting cooperatives' relative importance. The percentage of exporters varies between 36% and 69%. Overall, the weight of exporters increases across time.

Table 1. Cooperatives' export patterns

Year	Exporters %	Year	Exporters %
1991	36.4	2004	62.5
1992	36.4	2005	62.5
1993	36.4	2006	69.4
1994	37.5	2007	69.7
1995	41.4	2008	68.4
1996	46.4	2009	67.7
1997	50.0	2010	68.2
1998	52.0	2011	67.9
1999	50.0	2012	68.7
2000	60.7	2013	68.1
2001	59.3	2014	69.2
2002	59.3	2015	69.6
2003	64.0	2016	68.2

Source: Own calculation based on ESEE.

3. Methodology

To analyse whether cooperatives operating in foreign markets present a higher level of innovation than those operating in a domestic market, we estimate the regression specified in (1).

$$Export_{it} = 1 \; if \; \beta_1 \, Innovation + \beta_2 \, Control_{it-1} + \gamma_j + \delta_t + u_{it} \geq 0$$
$$Export_{it} = 0 \text{ otherwise} \tag{1}$$

Where *Export* is a dummy for the export status (1 if firm *i* exports, 0 otherwise), *i* is the index of cooperative, *t* is the index of year. *Innovation* is the variable that proxy the cooperative's level of R&D activities. *Control* is a vector of control variables in logarithm (except productivity): cooperative

age to control experience, employment to control size, wages to control labour quality and total factor productivity (TFP) to control efficiency[1]. We examine these variables because they may have an influence over exports (Minondo, 2011; Ayllón and Radicic, 2019). We assume an industrial specific component (γ_j) (codes of 20 different industries, according to the three-digit aggregation CNAE-09 of manufacturing industries) and a time specific component (δ_t). All control variables are lagged to avoid simultaneity problems. We carry out an estimate of a bivariate probit model.

4. Results

Table 2 presents the results of our estimation. The innovation coefficient confirms the hypothesis of this paper: Innovation has a positive and significant impact over the cooperatives' exporting status. This would support the fact that cooperatives consciously increase their innovation processes in order to become exporters and that learning by exporting is contingent upon a firm's innovation capabilities. As Wu (2019) states, it is only with a sufficient amount of innovation that firms are able to learn from exports. This result goes in line with other studies focusing on Spanish manufacturing capitalist firms (Caldera, 2010; Cassiman and Golovko, 2011; Monreal-Pérez et al., 2012; Máñez et al., 2015).

[1] See Appendix 1 for details on calculating variables.

With respect to the control variables, our findings indicate that, overall, they matter. The figures of Table 2 suggest that the cooperatives' size has an influence on exporting. In this regard, Bretos and Marcuello (2017) suggest that cooperatives strengthen their position in foreign markets by creating cooperative groups and by cooperating with other cooperatives and local organizations.

Wages and age have a negative relationship with exporting, and productivity is not significant. With respect to wages, it is worth noting that they are more flexible in cooperatives than in capitalist firms (Díaz-Foncea and Marcuello, 2014). They internalise the negative externalities by decreasing working hours or wages instead of proceeding to a reduction of workforce (Pencavel et al. 2006, Burdín and Dean 2009, Sabín et al. 2013, Jaén 2017, Guzmán et al. 2019). This could help to understand the negative sign that we have found. The results relating to age and productivity are odder and do not agree with those reported by many studies focusing on Spanish capitalism firms (Caldera 2010, Monreal-Pérez et al. 2012, Máñez et al. 2015), although Ayllón and Radicic (2019) find that productivity is also not significant.

Table 2. Innovation and cooperatives' exporting status

Variable	Coefficients
Innovation	0.203*** (0.043)
Age	-0.324*** (0.094)
Employment	0.643*** (0.069)
Wages	-0.144*** (0.037)
TFP	0.108 (0.054)

Standard errors in parentheses. ***p<1%; **p<5%;*p<10%
Source: Own calculation based on ESEE.

6. Conclusions

This paper analyses the relationship between cooperatives export status and innovation. There are an important number of researches that find strong positive impact of capitalism firms' innovations on their export decisions. We deal with this issue focusing on an alternative organizational business formula as are cooperatives. We wonder if cooperatives transform their intention to export into the capacity to export by increasing their innovation. To carry out the empirical study we work with a well-known and widely used Spanish statistical source of the manufacturing sector. Our findings indicate that innovation is positively and significantly related to the cooperatives export status. Other variables as size (positively), age and labour cost (negatively), also influence over the exporting decisions. It may deduce that cooperatives consciously self-select into foreign markets and that learning-by exporting works under the innovation engine.

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Appendix 1

Measure details of the relevant variables

Age (years)
This variable reflects the year in which the company was incorporated.

Employment (Size)
This is measured as the average number of workers during the year.

Innovation
This is measured as total expenses on R&D plus imports of technology, over total sales (in %).

Total Factor Productivity (TFP)
Following Caves et al. (1982) and Good et al. (1997) the TFP index for firm i at time t is measured:

$$\ln TFP_{it} = \ln Y_{it} - \overline{lnY_t} + \sum_{t=2}^{t} \left(\overline{lnY_t} - \overline{lnY_{t-1}}\right) - \left[\sum_{n=1}^{N} \frac{1}{2}\left(S_{nit} + \overline{S_{nt}}\right)\left(lnX_{nit} - \overline{lnX_{nt}}\right) + \sum_{t=2}^{T} \sum_{n=1}^{N} \frac{1}{2}\left(\overline{S_{nt}} + \overline{S_{nt-1}}\right)\left(\overline{lnX_{nt}} - \overline{lnX_{nt-1}}\right)\right]$$

where Y_{it} denotes real added value produced by firm *i* at time *t*. The set of inputs (n) used is expressed by X_{nit} that can be, alternatively, real capital (K), labour (L) and real intermediate inputs (M). S_{nit} is the cost share of input X_{nit} in the total cost. Symbols with upper bars correspond to measures for the hypothetical firm (the reference point), computed as the means of the corresponding firm variables, over all firms in year *t*. The $\overline{lnY}$ and $\overline{lnX}$ reference points are the geometric means of the firm's output and input, respectively, while the cost shares ($\bar{S}$) are computed as the arithmetic mean of all firms.

In line with Delgado, Fariñas, and Ruano (2002); Fariñas and Martín-Marcos (2007); Máñez, Rincón, Rochina, and Sanchís (2005), the variables used in the measuring of this index are as follow:
Real added value (Y_{it}): we have constructed individualized deflators for each cooperative that have been applied to the nominal added value. The deflator has been elaborated using the information of the variations in the sales prices in the different markets where the cooperatives operate, weighted by sales of each market over the total sales.

Labour Factor (L): The labour input is approximated by the total effective hours worked. They are measured as the product of the average number of workers during the year (this is calculated as the sum of the full-time regular personnel, 1/2 of the part-time regular personnel, both items on December 31st, and the average number of eventual workers) and the hours effectively worked during the year per worker (this is equal to the sum of the normal work time and overtime minus the non-worked hours).
Real capital (K): The capital is approximated by the net capital stock. The variable is expressed in real terms using the price index for equipment goods published by the Instituto Nacional de Estadística (INE).
Real intermediate inputs (M): This is defined as the sum of purchases and external services, plus the variation in the stock of purchases. The variable is expressed in real terms using the price index for intermediate goods published by the INE.

To calculate the costs share
1. Cost of labour: The cost of labour includes gross salaries and wages, compensations, social security contributions paid by the company, the contributions made to supplementary pension systems and other social expenses.
2. Cost of capital: We estimate a user cost of capital (Cc) as follows:
Cc= cost of firm's long-term debt + depreciation rates – variation of the price index for capital goods.

Wages
This records gross salaries and wages, compensations, social security contributions paid by the company, the contributions made to supplementary pension systems and other social expenses.